

NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

KEY EMERGING TRENDS IN THE INTERMODAL FREIGHT TRANSPORTATION INDUSTRY

by

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December 2000

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INDUSTRY**

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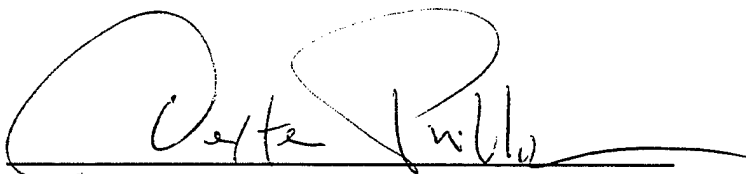
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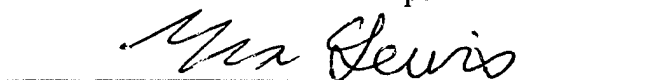
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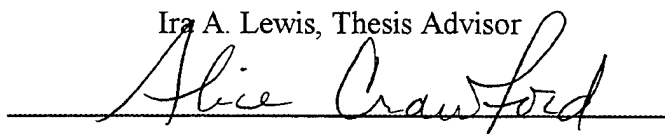


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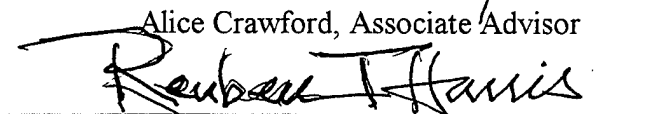
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ABSTRACT

This thesis addresses the key emerging trends in the intermodal freight transportation industry. Interviews were conducted with a focus on perceptions that the various intermediaries have towards their working relationships with one another, the impact of emerging technologies, and what government policies and regulations should be enacted or repealed in order to improve the industry.

Eight individuals were interviewed representing the following seven intermediaries: 1) Shipper, 2) Ocean Carrier, 3) Port Authority, 4) Railroad, 5) Trucking, 6) Third Party Logistics and Intermodal Management Company, and 7) Drayage. All interviews were taped and then transcribed.

A major finding is that the U.S. government, industry, and academia must work in a collaborative effort to develop and maintain educational and internship programs to prepare present and future transportation managers and technicians to become the industry's leaders.

Although dramatic developments in advanced technologies have been the single greatest factor influencing changes in transportation during the past 25 years it is people who manufacture goods, provide transportation services, and ultimately consume the goods produced. Therefore, it is the "human-in-the-loop" who when properly equipped, trained, and experienced will truly revolutionize the commercial intermodal freight transportation industry.

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I would like to acknowledge and thank the eight individuals who took the time out of their extremely hectic schedules to conduct the interviews. They are all very successful and respected in their sector of the industry. Together they represent 243 years of experience in the industry. The views of these individuals, as a group, provide an excellent representation of the industry.

Probably the most striking information to come out of this research is the indication that people employed in the intermodal freight transportation industry are provided only limited professional or new technology training. Despite this circumstance, these interviewees and the thousands like them employed in the industry, have made possible the most impressive productivity gains in logistics that the nation has ever experienced. One is left to imagine what could be accomplished, and the resulting impact on the nation, if these individuals had access to newly emerging technologies and the professional and technological training to optimize their capabilities. The entire intermodal freight industry owes each of you and the thousands like you, a big round of applause; and of course, access to new technologies, training, and more money!

Lastly, I would like to thank Dr. Ira Lewis and Alice Crawford for their guidance, wisdom, and help, while supervising this project. Their professionalism and quick turn-around times are greatly appreciated.

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I. INTRODUCTION

A. PURPOSE OF THE STUDY

The purpose of this research is to provide Department of Defense (DoD) strategic mobility planners with insights on emerging trends in commercial intermodal freight transportation. The goal is to identify and analyze current key developments in government policies and regulations, technology, and the interrelationships of intermediaries that are having an impact on the industry. The thesis will also provide recommendations to the United States Transportation Command (USTRANSCOM) to help focus long-range DoD planning efforts and the allocation of scarce resources.

B. BACKGROUND

A well-functioning freight transportation system is essential to our national prosperity and defense. Advances in freight transportation and logistics in recent decades have been a major source of productivity growth in the U.S. economy. In addition, the DoD is one of the largest users of the U.S. commercial transportation system.

Many of the advances in freight transportation have been in intermodal transportation. Intermodal transportation is defined as: "The concept of transporting passengers and freight on two or more different modes during a single journey, in such a way that all parts of the transportation process, including the exchange of information are efficiently connected and coordinated." (Muller, 1) However, the term "intermodal" is

often used to identify the important overall advances in freight transportation and logistics of recent years.

Intermodal is more than simply taking a container from a ship or factory, transferring it to a railroad, and eventually transferring it to a drayage contractor for delivery to a consignee. It involves conducting business within existing governmental policies and regulations; managing the transfers between modes through the use of developing technologies; and the interactions between many intermediaries to enable the seamless and real-time tracking, scheduling, documentation, and delivery of the intermodal shipment to a satisfied customer.

C. SCOPE AND LIMITATIONS

The research will include a comprehensive review of existing literature and the conduct of interviews to identify current trends in the U.S. commercial intermodal freight transportation industry.

For the purpose of this thesis, intermodal freight transportation is defined as the transport of goods in containers that can be moved on land by rail or truck and on water by ship or barge during a single journey.

D. BENEFITS OF THE STUDY

DoD is one of the largest users of the U.S. commercial intermodal transportation system. The military relies heavily on existing commercial intermodal transportation infrastructure, assets, skill sets, and processes. Currently, more than 85 percent of DoD's peacetime and wartime transportation requirements are met by the commercial sector.

(USTRANSCOM, 1999) Additionally, the complex interrelationships between DoD, the U.S. Department of Transportation (DOT), and the commercial industry play a critical role in the movement of military personnel, equipment, and cargo in times of peace and war. As a result of this reliance on the commercial transportation industry, DoD strategic planners must increasingly consider the impacts that trends in the commercial sector will/could have on strategic mobility.

Hopefully, this research by identifying and analyzing emerging trends in the commercial intermodal freight transportation industry may help the DoD in planning for strategic mobility and to better allocate scarce resources.

E. RESEARCH QUESTIONS

The primary research question for this thesis is:

What are the key emerging trends in the commercial intermodal freight transportation industry?

The following are secondary questions to help develop and define the primary research question:

- Which technological developments are having the greatest impact on the commercial intermodal freight transportation industry?
- Which business “best practices” are having the greatest impact on the commercial intermodal freight transportation industry?
- What are the major interrelationship dynamics in the industry?
- What governmental policies and regulations should be enacted or repealed to improve the industry?

F. RESEARCH METHODOLOGY

The methodology will include the following:

- Conduct a comprehensive literature review.
- Conduct interviews with various shippers, ocean carriers, port authorities, railroad firms, truckload carriers, drayage firms, intermodal associations, and government organizations.

Interviews will focus on perceptions that the various intermediaries have towards their working relationships with one another, to what extent emerging technologies impact their industries, and what government policies and regulations should be enacted or repealed in order to improve the industry.

- Analyze the data collected from the interviews in order to answer the primary thesis question.
- Provide recommendations and conclusions.

G. ORGANIZATION OF THE THESIS

The thesis is organized into the following chapters.

Chapter II: Literature Review – This chapter provides a comprehensive review of historical and current literature pertaining to the commercial intermodal freight transportation industry. From this review current trends in the industry are identified.

Chapter III: Methodology and Data Summary – This chapter discusses the research methodology, data analysis, and theme development of this thesis.

Chapter IV: Analysis – This chapter presents data analysis and developed themes along with supporting excerpts from interviews.

Chapter V: Conclusions and Recommendations – This chapter contains a summary of principal findings and offers recommendations based on the study.

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II. LITERATURE REVIEW

A. INTRODUCTION

In its most simple form, intermodal transportation is the movement of goods by several transportation modes during a single journey. As described, intermodal transportation has been around since man first developed a need to transport goods. And, prior to the invention of the steam engine, all the transport and transfer of goods between the various modes was accomplished by human and animal labor and the wind. Many changes have occurred in intermodal transportation over the past century and some of the key historical developments in the United States have been:

- Water and land exchanges between waterborne rafts, ferries, barges, and vessels with horse drawn-vehicles and railroads
- Transportation on the Erie and Pennsylvania Canals
- Seatrain Intermodal Service (the *New York* and *Havana*)
- Truck–Rail Intermodality
- Land Bridges (Steamship-Rail)
- Inland and Coastal Waterways
- Pipelines
- Air-Surface Intermodality
- Cargo Containers

Today the term “intermodal” is often associated with a wide variety of transportation activities and is often used to refer to many of the important overall

advances in freight transportation and logistics of recent years. Accordingly, a more complete definition is required. Thus, intermodal transportation can be defined as “the concept of transporting passengers and freight on two or more different modes, during a single journey in such a way that all parts of the transportation process, including the exchange of information, are efficiently connected and coordinated.” (Muller, 1)

Freight transportation is a joint enterprise of the private sector and government. Private firms provide nearly all the direct services to shippers and own transportation equipment and portions of the transportation infrastructure. The government provides major infrastructure components – highways, ports and harbors, airports and airways, and inland waterways.

The transportation industry is rapidly changing due to technological advances and the search for faster and cheaper ways to transport freight across the globe. Given the importance of government programs that serve freight transportation, a review of these programs is desirable. These programs should also have sufficient flexibility to support the dynamic nature of the industry. (SR-252, 1-10)

B. GOVERNMENT POLICIES AND REGULATIONS

An efficient and effective freight transportation system is essential to national prosperity and defense of the nation. The many advances in transportation technologies and logistics management over the past decade have been a major source of productivity growth in the U.S. economy. It is estimated that these productivity gains have been reducing costs to U.S. businesses at the rate of \$20 billion per year. (SR-252, 1-10)

National military objectives were achieved during the Gulf War and more recently in Bosnia, and intermodalism provided a strategic and tactical advantage in both conflicts.

In the past two decades freight transportation has been transformed from an industry dominated by regulation and resistant to innovation, to a dynamic sector contributing to productivity growth and driven by rapid technological, market, and organizational change. Some of the most influential governmental policies and regulations have been:

1. Deregulation

Significant deregulation legislation includes the Railroad Revitalization and Regulatory Reform Act of 1976, Staggers Rail Act of 1980, Airline Deregulation Act of 1978, Motor Carrier Act of 1980, Bus Regulatory Reform Act of 1982, the Shipping Act of 1984, and Ocean Shipping Reform Act of 1998.

Deregulation of the aviation, rail, motor carrier, and maritime shipping industries over the past 25 years opened the door to thousands of new competitors, creating an environment that spawned innovative, efficient, and affordable transportation services, which supported a rapidly globalizing economy. In return, globalization enabled growth of a transportation system that, today, spans every corner of the world. (TCFOT, 2-1)

It is true that in most cases deregulation has benefited the transportation industry and the customers it serves, but in certain rural areas it has drastically decreased service choices.

2. Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA)

ISTEA authorized distribution of \$151 billion over six years to states for highway, mass transit, and safety programs. ISTEA strictly limited the types of projects that could qualify for federal aid. It did not earmark specific funds for intermodal freight projects, but did provide a mechanism for these projects to be funded out of the Highway Trust Fund. ISTEA was intended to encourage an intermodal approach to transportation, not to mandate it. ISTEA expired in 1997 and was superseded by the Transportation Equity Act for the 21st Century (TEA-21).

3. Transportation Equity Act for the 21st Century (TEA-21)

TEA-21, which was signed into law on June 9, 1998, built and expanded on ISTEA policies and programs. TEA-21 guaranteed distribution of \$217.3 billion for transportation infrastructure and safety. TEA-21 took two important steps further than ISTEA by guaranteeing funding and continuing and expanding environmental programs created by ISTEA.

C. TECHNOLOGY

Dramatic developments in advanced technologies have been the single greatest factor influencing changes in transportation during the past 25 years. In 1975, most of America's transportation infrastructure rested in technologies that were, in some cases, almost a century old. Since then, technology has quietly and thoroughly transformed the nations transportation systems. (TCFOT, 6-1)

These advances in information and equipment technologies have led to an increasing proportion of freight being moved by intermodal shipments.

1. Information Technology

Information technology (IT) is transforming the intermodal industry. IT has enabled its users to plan, schedule, track, audit, and document intermodal shipments moves in real time. Intermodal freight movement is increasingly becoming “mode invisible” as the ability to interconnect and interchange information among the modes is optimized.

The Transportation Efficiency Act for the 21st Century recognized the need to broaden the federal focus on maturing information technologies and their deployment. The U.S. Department of Transportation (DOT) was charged with the creation of the Intelligent Transportation System (ITS) architecture and the drafting of related standards. ITS represents the application of advanced technologies involving information processing, electronics and communications, and management strategies to improve our transportation system. Federal funding for ITS infrastructure was \$1.3 billion from FY 1991 to FY 1997. (TCFOT, 6-6)

As part of the Transportation Equity Act for the 21st Century, the Department of Transportation (DOT) was required to develop the Intermodal Transportation DataBase (ITDB). The ITDB provides a single data-mining portal for transportation data from all the Bureau of Transportation Statistics (BTS) and DOT operating units. The web site, which is available at www.bts.gov, will provide analysts and the public with transportation safety, demographics, travel, and economic statistics.

As companies connect, the growing use of the Internet and the trends in electronic commerce appear to be improving the visibility of inventory and its location within our

supply chains. U.S. business logistics costs were equal to 9.9 percent of nominal gross domestic product (GDP) in 1999. Transportation costs continued at 6.0 percent of nominal GDP for the seventh consecutive year. The best inventory management performance to date occurred in 1999, with inventory to sales ratios declining from 1.38 to 1.32 months of supply. (BEA, 2000)

Business to business e-commerce has changed the way companies interact. Web-based connectivity has enabled the transaction network to become more efficient, allowing savings to be shared. Some companies have made tremendous investments in information technology. A recent national logistics survey of shippers confirms that the cost and complexity of integrating traditional electronic data interchange (EDI) into current operations has been so staggering that the companies have been unable to improve efficiency. The trend is toward web-based solutions, which are yielding better results, and show more potential for growth. (WTMI, 2000)

However, those companies that only participate in the business to consumer e-commerce sector are running out of operating cash at an alarming rate. As a result, a large percentage of these new start-ups have gone out of business and others are experiencing rapidly declining values in the stock market. This is largely due to the fact that direct e-tailers have invested enormous sums of money in marketing and technology in order to build brand, but have developed little or no capabilities in physical distribution. (Smith, 2000)

In contrast, traditional retailers, especially those with an existing catalog business, are beginning to combine traditional retailing with the Internet. These companies have the

benefits of experience with the customer, successful brand names, reputations for quality, and the necessary distribution infrastructure and operating skills. As a result, the companies are experiencing far more success than the pure play e-tailers. (Smith, 2000)

2. Maritime

Ships will continue to get bigger and carry more cargo. Today's container vessels have 50 percent more cargo capacity than those of 1975, and some are triple that size. The current debate is over the number and size of these post-Panamax vessels and the ability of the global economy to generate sufficient container traffic to operate these vessels profitably. An 8,000 twenty-foot equivalent unit (TEU) ship was developed in 1997 and a 13,000 TEU ship design is currently being studied.

When the first generation of these ships was being produced in the 1970s, they required many waterways and ports to be deepened to accommodate the increasing drafts of these vessels. Unfortunately, a political stalemate of funding in the early 1980s stopped these improvements. The Water Resources Development Act of 1986 (WARDA), instead of providing appropriations to pay for port deepening and maintenance dredging, levied a tax on cargo value (the Harbor Maintenance Tax) and required state and local agencies to pay a share of the costs. The U.S. Supreme Court has since ruled the tax unconstitutional when applied to exports.

Port authorities must now find financial resources for expansion and deepening projects to accommodate the new generation of bigger, faster cargo ships. In addition,

they must address the environmental concerns associated with these projects. (TCFOT, 2-25)

3. Rail

Intermodal rail technology has changed rapidly, especially in the areas of automation and flatcar equipment. Most advances have been incremental changes to existing technologies (such as doublestack cars and the Iron Highway). Most rail observers agree that articulated cars represent the type of technology that will be the future of the rail intermodal industry. Articulated cars are lighter in weight, have lower purchase prices, are less expensive to maintain, and prevent cargo damage by eliminating most slack action and roll dynamics between cars. (Muller, 391-392)

The government and rail industry are developing an Intelligent Railroad System that will incorporate evolving information technologies into train operations and maintenance. Some of the developments are the Nationwide Differential Global Positioning System (NDGPS), Positive Train Control (PTC) - an integrated command, control, communications, and intelligence (C3I) system, Electronically Controlled Pneumatic (ECP) brakes, Automatic Equipment Identification tags for all equipment, wayside equipment sensors to identify defects on passing trains, and intelligent grade crossings to reduce grade crossing collisions.

Further advances in rail service fall into three groups: accelerated rail service over existing railroads (Incremental High-Speed Rail [HSR]) capable of speeds from 90 to 150 mph, new high-speed rail systems (New HSR) with speeds on the order of 200 mph, and

magnetic levitation (MagLev) capable of speeds of 300 mph. Currently, these technologies are being applied to high-speed passenger transportation but will eventually be used to transport freight.

4. Motor Carriers

Most of the advances in this mode of transportation are in more fuel-efficient tractors and lighter and stronger trailers with increased cargo capacity. Also, the Commercial Vehicle Operations (CVO) initiative, which is part of the Intelligent Transportation System, project described earlier in this chapter, is expected to improve administrative efficiency, highway data collection, safety, and reduce operating costs to commercial vehicles.

5. Aviation

Aviation will continue to expand its role in intermodal freight transportation, particularly in the shipment of high value and time-sensitive cargo. Large aircraft, such as the Boeing 747-400 freighter and the MD-11, and now Russia's Antonov-124, can accommodate 20- and 40-foot International Organization for Standardization (ISO) ocean containers. However, until lighter and stronger sea-air containers are developed and used, the additional handling cost of transferring cargoes between the heavier ISO ocean container (which is not suitable for air transport) and the ISO air containers will continue to be more costly than all-ocean service. (Muller, 389)

To accommodate this growth and enhance current safety and efficiency levels, the Federal Aviation Administration (FAA) is engaged in a comprehensive program to

modernize the Air Traffic Control (ATC) system. This includes replacing radar surveillance systems; modernizing voice communication systems; introducing enhanced automated navigation aids, data links, and improved weather systems.

Although freight transportation has benefited from dramatic improvements in information and equipment technologies over the past decade; the progress linking the evolving information and transportation systems has been slowed by lack of interoperability, incomplete network infrastructure, and lack of expertise in some sectors that participate in the freight transportation system. (SR-252, 67)

D. INTERRELATIONSHIPS OF INTERMEDIARIES

While the intermodal industry has experienced strong growth over much of the last two decades, the industry has had a number of service problems that may prevent predicted growth from occurring. Many of these service problems relate to the structure of the intermodal industry and conflict between the intermediaries. This conflict has prevented the close coordination and communications needed to optimize efficiency within the industry. (Taylor and Jackson, 2000)

The industry is structured around each individual mode of transportation, and because intermodal transfers often require the coordination of government entities and multiple private intermediaries, physical and organizational bottlenecks sometimes develop that affect the performance of the entire freight system.

Conflict between the intermediaries, who in the past have functioned predominantly within their own respective mode, has impeded the formation of

mechanisms to coordinate access to intermodal equipment, facilities, and the flow of information between modes during intermodal operations.

Due to the increasing complexity of the intermodal industry it is important to be familiar with the various functions that are performed by the intermediaries. The intermediaries and their associated functions are summarized in Table 1.

Each of the intermediaries has inherent advantages and customers should be free to exploit those advantages. For example, trucking firms enjoy a comparative advantage in package delivery and pickup in urban areas. In contrast, railroads are generally more efficient in hauling heavier and higher volume goods over long distance, and thus enjoy a comparative advantage when competing for those types of goods. In order to optimize the entire system, intermediaries should be able to develop their comparative advantages to the fullest extent and offer the most efficient services possible to their customers.

Furthermore, the growth of intermodal transportation rests upon the ability of the industry to provide a service that allows producers to lower the total supply chain cost of delivering the product to the customer. This can be accomplished by reducing in-transit times, providing total asset visibility, minimizing documentation (through use of internet-enabled solutions), reducing loss and damage claims, reducing/optimizing inventory, and lowering rates. In order to gain these improvements in operating cost and service, both carriers and shippers must be willing to change and to cooperate. (Mattingly, 2000)

However, it appears that carriers and shippers may be unwilling to evolve in order to optimize the entire intermodal system. This is due, primarily, to existing conflicts between the various intermediaries within the intermodal industry. The cause of these

conflicts varies from incompatible goals, different perceptions of reality, different perceptions of appropriate roles, and lack of communication. (Taylor and Jackson, 2000)

But as firms intensify their efforts to examine and understand their core competencies, the need to collaborate with other organizations will become more and more apparent. Given the complexity and dynamic nature of today's rapidly changing business world, it is a mistake for any one firm to try to 'go it alone.' Working closely with other organizations is a concept that is rapidly gaining acceptance among market leaders who understand that collaboration is imperative to their continued success. (Langley, 2000)

Due to the complicated nature of these conflicts and the limited scope of the thesis it is not possible to address the issue of conflict, power, and evolution in the intermodal transportation industry thoroughly in this research paper. However, the topic does merit further studies and is listed in Chapter V of this paper as a potential area for further research.

Table 2 provides a very brief summary of issues that may cause conflicts between intermediaries, thereby preventing optimization of services within the intermodal industry.

One of the research areas recommended by Taylor and Jackson in their article "Conflict, Power, and Evolution in the Intermodal Transportation Industry's Channel of Distribution" (2000) was on evaluation of intermediaries' perceptions of the effectiveness of cooperation tactics in developing increased cooperation and performance within the intermodal freight transportation industry. This research paper will use interviews with

those intermediaries to address the following two questions concerning this research area and explore the major interrelationship dynamics in the industry:

- What kind of working relationships do the intermediaries have with their competitors?
- To what extent are industry associations helping to establish a dialogue between all the various intermediaries?

Furthermore, not directly related to the Taylor and Jackson article, this research paper will address the primary and additional secondary research questions outlined in Chapter I of this paper.

Table 1. Intermediaries and their Functions

(From Taylor and Jackson, 2000)

FUNCTIONS	GOV	SHP	IMC	3PL	TL/ LTL	RR	DRAY	OC NVOCC	PORT/ TERM
Regulation/ Standards	X		X			X			
Infrastructure	X					X			
Marketing/Sale			X		X	X		X	
Equipment Provider					X	X		X	
Stuffing		X	X	X	X		X	X	
Drayage					X		X		
Line-Haul					X	X		X	
Port/Terminal Operations						X		X	X
Stripping		X	X	X	X		X	X	
Storage		X	X					X	
Operations Coordination			X	X	X	X		X	
Equipment Management			X		X	X	X	X	X
Invoice/ Collection			X		X	X		X	
Customs	X	X						X	
Key to Intermediaries: GOV – Government RR – Railroads SHP – Shippers DRAY – Drayage Firms IMC – Intermodal Marketing Companies									
OC – Ocean Carriers 3PL – Third Party Logistics Firms NVOCC – Non-Vessel Operating Common Carrier TL/LTL – Truck Load/Less-than Truck Load Firms PORT/TERM – Port/Terminal									

Table 2. Source of Conflicts for Intermediaries

(From Taylor and Jackson, 2000)

	GOV	SHP	IMC	3PL	TL/ LTL	RR	EQPT	DRAY	OCEAN/ NVOCC	PORT/ TERM
GOV		Weight Levels			Safety	Grade Crossing Merger		Driver Abuse	Ship Sizes	Hours of Service
SHP	Taxes Infra		Rates Service	Rates Service	Rates Service	Rates Service Damage	Equip Status	Service Damage	Rates Availability Service	
IMC	Taxes Reg Infra	Slow Pay Demur Rates Service		Comp	Comp	Comp Costs Service	Avail	Costs Service	Comp Service Costs	Service
3PL	Taxes Infra	Rates Service	Comp		Cost Service	Costs Service Damage	Avail	Costs Service	Costs Service	Service
TL/LTL	Reg Taxes Infra	Rate Service Slow Pay Demur	Comp	Comp		Comp Costs Service Damage	Avail Costs		Costs Service Avail	Hours of Service
RR	Reg Taxes Infra Access Truck Size	Rate Service Slow Pay Demur	Comp Loyalty Market	Loyalty Market	Comp Loyalty Market		Avail Costs	Costs Service	Loyalty Marketing	Costs Service
EQPT	Stand		Purch		Purch	Purchase			Purchase	
DRAY	Access to Rds Reg Taxes	Turn Around Time	Rates Service		Comp	Yard Rates				Hours of Service
OC/NVOCC	Taxes Infra	Rates Service	Loyalty Market	Loyalty Market	Loyalty Market	Loyalty Market Costs Service Damage	Avail Costs	Costs Service		Hours of Service Facilities
PORT/TERM	Access to Rds Taxes					Loyalty Rate Service		Reliability		

KEY:

Infra - Infrastructure
Reg - Regulations
Stand - Standardization

Rds - Roads
Demur - Demurrage
Comp - Competition

Purch - Purchases
Market - Marketing
Avail - Availability

Note: See Table 1 for acronyms identifying intermediaries.

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III. METHODOLOGY

A. DATA COLLECTION

The data were collected through in-depth interviews with people currently working in the domestic intermodal freight transportation industry. The intent of the research was to interview only those individuals who worked at an operational level within the industry and, as such, were involved extensively in the day-to-day operations of their firms.

The researcher conducted interviews in person and over the phone. The time required for conducting an interview ranged from 20 to 55 minutes. Any variations in the time required for conducting an interview were due to the length of the responses provided by the interviewee. All interviews were recorded on audiocassettes and then transcribed verbatim for ease of analysis. Eight individuals were interviewed representing the following seven intermediaries: 1) Shipper, 2) Ocean Carrier, 3) Port Authority, 4) Railroad, 5) Trucking, 6) Third Party Logistics and Intermodal Management Company, and 7) Drayage.

The eight interviewees, composed of two women and six men, are all successful and respected in their sector of the industry. The interviewees have a combined total of 243 years of experience in the industry. With an average of 30.4 years of experience per interviewee, which ranged from 19 to 45 years, the views of these individuals, as a group, provide an excellent representation of the industry.

Each interviewee was asked for permission to record the interview in order to improve accuracy, and was also informed that no data traceable to the interviewee would

be used. Furthermore, each interviewee received and approved a transcribed copy of the interview prior to its inclusion in the research.

All interview questions were open-ended and provided ample latitude for the interviewees to openly discuss or expound on any issue they wished to address. On occasion, the researcher used probing questions to gain further detail and clarification on a response provided by the interviewee. (See Appendix A for interview questions.)

B. DATA ANALYSIS AND THEME DEVELOPMENT

The data were compiled from the interview questions and then analyzed through content analysis to identify key trends and repeated issues. These key trends and repeated issues were further analyzed and grouped together to develop themes (See Appendix B for a list of themes). The themes are presented in Chapter IV along with supporting justification. Each justification is reinforced with quotations from the interviewees. The themes are then used to answer the primary and secondary research questions in Chapter V.

IV. ANALYSIS

A. OVERVIEW

The data analysis yielded eleven prominent themes. Each theme is presented along with supporting justification. Each justification is reinforced with quotations from the interviewees. The interviewees were randomly assigned a number one through eight in order to identify them and the transcript of their interview (e.g., Interviewee ONE). The number assigned contains no identifying information on the individual interviewed.

B. THEME I: THE FAX MACHINE IS ONE OF THE TECHNOLOGICAL DEVELOPMENTS THAT HAVE HAD A GREAT IMPACT ON THE INTERMODAL TRANSPORTATION INDUSTRY

When asked, "Which technological developments are having the greatest impact on the industry and the way that you do business?" most interviewees responded that the fax machine, although in existence for quite some time, had made the biggest impact on the way that they conducted business.

Interviewee ONE:

I would have to say the fax. I know that the Internet is used extensively by the larger companies and with the larger shippers and the larger carriers. To them, the Internet has to be a tremendous help. But being small, and in an area where you have the smaller businesses...we do not use the Internet.

Interviewee TWO:

A lot less paper now. Telephones are used instead of personal visits. The fax machine has just absolutely changed everything. At one time, when the driver picked up, you gave him a bill of lading and he took it into his office. They took the information from that and the drivers carried the paperwork

along with the shipment. Now, as an example, a lot of people were cut out of all the companies, both rail and trucking. An example right now is when I turn in my switch order or my switch instructions to the railroad each morning, I have to fax Atlanta and the Norfolk Southern Railroad to get the cars that I want released and the cars I wanted spotted. I then fax the bill of lading for the release cars to another location in Atlanta. Then I turn around and send both of those instructions locally because locally the Norfolk Southern cannot get Atlanta to furnish them with the information in a timely manner. They use the same information and fax to my customers to let them know that the shipment is in transit to them. So the fax machine has just become invaluable.

Interviewee FIVE:

Well, the fax has been a big boom. Of course, that's not recent, but go back 10 years. The fax machine, in my opinion, for me personally, has been a big boom where you can communicate quickly. The computer, with what I do here, has really not been as effective a tool as I would have liked because it still cannot work out our rates.

C. THEME II: TOTAL ASSET VISIBILITY (TAV) THROUGH WEB-BASED SOLUTIONS IS HAVING A GREAT IMPACT ON THE INTERMODAL TRANSPORTATION INDUSTRY

Many of those interviewed cited technological developments that were beginning to enable TAV, as being of great importance to achieving substantial efficiencies within the industry. However, most expressed concerns about proprietary electronic data interchange (EDI), the electronic exchange of documentation that is part of TAV, and felt that web-based solutions would ultimately prevail in the industry. In fact many of their companies were already attempting to move to a web-based system.

Interviewee SEVEN:

The only thing that's circumvented the rail industry's lead on technology or data handling capabilities has been the satellite and communications company QUALCOMM, which has enabled the tracking and the communicating between dispatch centers for the truck lines and the truck

itself. That technology has been in place now for several years and has revolutionized the ability of a dispatch center to better manage that asset of truck and driver.

What we see on our side of the equation is that it was great for the truck lines, for the truck management philosophies and reporting, etc., etc. It was great for the truck itself and the driver. What it forgot, though, was that what was most important to the shipper was behind the truck. It's in the trailer; it's the trailer itself. Where's the trailer? Where's the freight? QUALCOMM doesn't achieve that. The technology that's out there is on the verge of achieving that. Several of the trailer leasing companies that supply equipment to the motor carrier industry are spending large sums of money today to re-equip their leased fleets with either satellite tracking or cellular power tracking so that the trailer at least has some hands-free visibility in the system. In years past, even in the rail industry, if you didn't put it in the computer manually with some key strokes from a weigh bill, transmission or something, you didn't really know what was in the trailer or where it was going or where it had just passed.

Over the last few years, the rail industry has used a radio frequency technology that enables every car, every rail car, to be read by railroad scanners. That automatically updates the databases for what we call car location messages. This happens automatically without a clerk or anybody having to make a keypunch or input additional information into the database. But that's only for the car itself. If you're in the intermodal world, it still doesn't address the trailer or the container that's sitting on top of the car.

The ones who understand it [the importance of TAV], who still have the time to care about thinking strategically, are thinking about the future and what their future needs are. The future to them may be next week, but it's still better than just thinking about right now, the current crisis. Those folks who have time; I applaud and appreciate anybody that's making investments [money and time] in that direction, cause they see total asset visibility, as the next great step; they'll be able to effectively manage their productivity at their own shipping or receiving locations.

Interviewee EIGHT:

Well, right now, the transfer of container information between the railroads and the carriers is "one big help." We can get updates on the location of our containers, anywhere in the country, every couple of hours. We're also getting to the point where we can do our documentation electronically,

instead of being typed up and mailed; and then retyped and sent back by mail. We can do this with an EDI transmission, trade the necessary documents and get them back out. However, we're changing to a web-based solution instead of a proprietary EDI format.

Interviewee FIVE:

Yeah, it's great when it works. You know, we have a system set up with one of the companies, USA Truck, which is one of the larger companies that we represent. They have about 1700 units [commercial vehicles]. And we're set up on the Internet with them, or we just go in and get information on all of our loads on a daily basis. Kind of follow them and advise our customers. So that's good.

Interviewee THREE:

One of our first projects is to centralize the planning of all the intermodal yard train schedules, as well as the main lines of the trains coming in to us, whether they're commercial grain or intermodal. We want to try and centralize all of that planning and scheduling. The first thing that we want to do is to put the schedules on a web site. The site would be accessible by everybody actually involved in moving containers, including the steamship lines.

Interviewee FOUR:

TAV is probably the single most significant development thus far and it continues to evolve. The problem has been with proprietary formats and everybody [intermediaries] having varying degrees of power over each other. They were all using it as a marketing tool for their particular end. The whole thing was dysfunctional because as long as you [customer] called me [railroad], I could tell you where your container was on my railroad. I could not help you if it [customer's container] interchanged with a different railroad in Chicago for delivery back East. An even worse scenario is when the railroads turn it [customer's container] over to a trucker, who then delivers it to your door. It [TAV] just isn't going to happen.

**D. THEME III: TECHNOLOGICAL DEVELOPMENTS HAVE IMPROVED
THE ABILITY OF THE INTERMEDIARIES TO PROVIDE BETTER
SERVICE TO THEIR CUSTOMERS**

All of those interviewed felt that technological developments have greatly improved their ability to provide better service to their customers. However, many felt that technology had complicated or inhibited the personal contact and relationships required for establishing long-time partnerships with customers.

Interviewee FIVE:

It's just a big improvement in communications. The bad side of it is that it eliminates some of the personal contact. You know you can sit here and actually handle the business with very little personal contact. And somewhere that, I think, tends to be a disadvantage. From my standpoint, we try to make personal contact with our customers, even if we've got to work on weekends. The preferred way to do business may be through e-mail or whatever, but we still need to try and work on personal contact.

Interviewee EIGHT:

Technology has improved it [customer service] greatly because, number one, everything is smoother, there's less manpower spent, less phone calls and eventually, it's going to drive even more costs out of the equation.

Interviewee SIX:

It has improved relationships to one degree. I can now confirm - - I don't have to sit down and physically type out a letter in the typewriter. I can do the e-mail thing or I can use the fax, whatever the customer prefers, and confirm rates and correspondence that way. It is a lot quicker. And you can get it out to a number of people at once. You don't have to make copies and do all this. You know, just one little click and everybody gets it. That's been a big help in saving time.

Interviewee TWO:

It has hurt that we no longer have the personal contact with the customers. We are no longer able to explain to them, you need to do this vs. that.

Right now all that matters is the lowest cost. That's all they [management] look at and that's all they're being paid to look at.

**E. THEME IV: THE INTERMODAL TRANSPORTATION INDUSTRY IS
ABLE TO ATTRACT AND RETAIN DEDICATED EMPLOYEES**

The intermodal transportation industry is able to attract and retain dedicated employees. In fact, most of those interviewed stated that they had started out at an entry-level clerical position and had never left the industry to pursue a different career. Many of the interviewees indicated that over the course of their career they had worked for several different intermediaries.

Interviewee TWO:

Actually, I started out in 1960 with the L&N railroad and spent about five years with them in Georgia. Started out in Kentucky, at the headquarters, and then moved to Georgia, where I stayed for about five years. Then I had an opportunity to go into the shipper industry with Ralston-Purina. And, actually that brought me back to Louisville, so I operated for five or six years with Ralston-Purina. And that was primarily in rail shipments. It was just a tight commodity. Probably 90 percent of the product was shipped by rail. From there, I went into the trucking motor carrier business with an LTL company, Leeway Motor Freight. I worked with them in Kentucky, opened up an operation in Arkansas, and then worked in Ohio. I was with them for about 10 years. From that point on, I came back to Kentucky and started a business of my own. I got connected with an international freight forwarder, doing some work with them. We were doing work with General Electric, so one thing sort of led to the other and I set up a drayage operation, my own company. And we were doing all the drayage of containers from General Electric to the rail ramp here in Louisville. At that time, I think there were two or three rail ramps. General Electric probably moved 300 containers a month. So we continued that for awhile and sort of branched out into the truckload business, eventually just handling truckload shipments. Did some container pooling for the steamship lines, while I was with GE. That probably took us into the early '80s. Then I had an opportunity to move my location over to the River Port Authority and operate in the foreign trade zone. So, I think we were

the first company to operate in the foreign trade zone here in Louisville. We did that through mostly the '80s, I guess.

Interviewee SEVEN:

Started in 1972. Actually was involved in the shipping industry prior to that, actually working in warehouses of shipping departments, that kind of stuff, since '66. My first railroad job was in '72, so day in and day out I have been involved in intermodal since that time.

Interviewee THREE:

I have been with the Port for a little over 24 years now and two years of it I was working actually for ... in the Traffic Department, working with rail tariffs and such, basically as a backup resource for the marketing people that were out and about. And that was the first two years. Since then, I have spent all my time in the Operations Department, starting out as a night and weekend superintendent and then moving into days as a day superintendent. Involved in the beginning with freight bulk operations at some of our terminals and moving that into container trucking at the container terminals. And subsequently my last position was an operations superintendent in charge of the Port's North Intermodal Yard, which is the rail interface between the container steamship line and the railroad. We would load and unload the double-stacked container trains. And as of this past summer, was promoted to director of rail operations, which is a new position at the port in the intermodal line of business.

**F. THEME V: THE INTERMEDIARIES ARE NOT PROVIDING
PROFESSIONAL OR NEW TECHNOLOGY TRAINING TO THEIR
EMPLOYEES**

All of the interviewees stated that the only type of training they had ever received from the intermediaries they had worked with was on-the-job-training (OJT). Most cited financial, time, and human resource constraints as the cause for shortfalls in training.

Interviewee ONE:

I guess working with the different companies that I've worked with has really given me a lot of training, more or less self-training.

Interviewee THREE:

I was tapped on the shoulder and they said, 'Hey, you're going to be our guy out there.' Same thing with the longshore foreman, who is still out there, the job was new to both of us. There was a learning curve involved, but it was a hard knocks kind of a thing. Try something and if it doesn't work, you don't try that next time, you try something else. And after 15 or 16 years of doing that, actually it wasn't that long, before people were coming to us, to see how it was done. When the steamship lines started seeing other steamship lines experience the positive nature of on-dock rail, other ports were coming to us to see how it was done and starting to pick our brains. We would go on trips and pick their brains as well, so it was kind of an on-the-job for the most part. I mean, you can learn certain aspects of this job in an academic institution, but it ain't nothing like the real world.

Interviewee SEVEN:

In the '80s, after deregulation, several times we attempted to start doing cross training and the same thing happened to us again as competition heated up right after deregulation. Everybody was making great money for the first couple of years of deregulation, and then like water seeking its own level, competition caught up and margins got squeezed and pretty soon nobody had the profits that they thought they should enjoy. And guess which budget got cut fairly early—anything to do with training. You hired experience you didn't have to spend any time on, you're supposed to pay them good money, they went out on the street and instantly produced profits for you. But if it didn't happen, you cut them off and started over, unfortunately.

To this degree today, I think it's probably still there. You do see some companies that talk about training programs or empowerment programs, but in the practicality of it, you see very little actual. Seminars occasionally or something like that, but real training, don't know.

Interviewee EIGHT:

Well, when I came to this position, I had four years in the industry and there was really no formal training; it was basically working on the job. I think that's one of failures of this industry. Margins are so low there's not enough money to provide proper training for most people to do the job efficiently either.

**G. THEME VI: THE MOST COMMON BUSINESS “BEST PRACTICE” IS A
COMMON SENSE APPROACH TO DAILY OPERATIONS THAT
INVOLVES KNOWING YOUR COST, YOUR CUSTOMER, AND
COMMUNICATING**

When asked, “Which business ‘best practices’ are having the greatest impact on the industry and the way that you do business?” most of the interviewees responded that they were unfamiliar with the term “best practices.” The researcher then asked probing questions to determine to what extent the interviewees were using activity-based costing, benchmarking, empowerment of employees, and developing a dialogue with their customers and competitors to improve their business operations. Most of the interviewees responded that they felt you had to know your cost and your customer in order to stay in business, and that was just common sense.

Interviewee SEVEN:

Pick all the buzzwords you want to throw out there. My definition is that it’s still fluff, until you get a practical application of it to the folks that have to do the job day in and day out. I’m not sure that any of it has had a great impact. We’ve gone through, especially the last 20 years, we’ve seen folks like the Council of Logistics Management, who do their seminars quarterly and annually, and a lot of the speakers talk about this best practice or that best practice or whatever. The way I classify it is it’s renaming common sense.

Interviewee EIGHT:

Well, we do that [activity-based costing] and it is reflected in all of our pricing. We find out what the cost is, what a fair return is, and that’s how we do our pricing. And that’s pretty much how a lot of people do it. It’s getting your cost in line, knowing exactly what your costs are, do your pricing based on that, and then driving whatever excess costs you can out of the equation.

Interviewee ONE:

In this office, anyway, we do everything we can to get to know our customers. We want to know what their wishes are and by researching that, then we can serve them better. We know if we send an extra fax or if we send them e-mail, that may be a lot easier, but we always pick up the phone and make personal contact. He knows you care. It's a customer service thing that I've learned. Customer service makes good relationships with the customers.

Interviewee THREE:

Yeah. Well, I don't know if you would consider it a business best practice, but get involved as much as you can. Make sure that if you are going to hire longshoremen for the next day to do a certain amount of work, do what you can to make sure that that certain amount of work is going to show up and that's a cooperative planning effort. Get as close to the BNSF and the belt line and the steamship line as you possibly can. As far as schedules go, understand what their schedules are and understand where any one of several of the schedules may break down, hope like hell that it doesn't, and just try and maximize the labor force that you're paying a whole bunch of money for.

Interviewee FOUR:

Relationships are the key up here—the communication. You have to know what the other guy and the other guys are doing. In addition to the conference calls, we have weekly planning meetings. The railroads are involved, the belt line is involved, steamship lines are involved, the stevedores are involved, and we invite longshore representatives as well. So that everybody knows what we want to have happen, everybody knows what the expectations are, everybody knows if there are equipment supply problems, rail car supply problems, if the vessel is late, whatever. We try and put it all out on the table to as many people, basically everybody that's involved in the operation, so that everybody knows what's going on and everybody knows what's expected of them. So, communications really is the biggest, I think, best business practice that we practice.

H. THEME VII: GOOD CUSTOMER RELATIONSHIPS ARE VIEWED AS BEING EXTREMELY IMPORTANT

The interviewees were asked to describe their working relationships with their customers. The responses varied from good to excellent and all responded that customer relationships were extremely important to them and to their firms.

Interviewee SEVEN:

You've got internal customers and you've got external customers and it doesn't matter probably what industry you're in, but particularly in the time-sensitive nature of the trailer-load freight business or container-load freight business. Your external customer, be it an actual manufacturer or retailer or somebody who's going to ultimately pay for the freight has to be your number one focus. But then in the stew chain, you might say, there are intermediaries, whether you call them intermodal marketing companies, or property brokers, or shipper's agents, or freight forwarders, or customs house brokers. There's a myriad of people involved in it [intermodal freight transportation]. Then, of course, to do intermodal, you're dealing with the trucking industry at both ends of the equation. Somebody's got to pick it up with a truck, somebody's got to deliver it with a truck. The railroad portion is still strictly where the steel wheel meets a steel rail. But there are a number of folks like that you've got to cater to some degree.

The internal customers, within the railroad itself, you've got departments, department heads, numerous functions, both mechanical and transportation-wise, accounting, credit and collections, administrative, human resources. And, unfortunately, you have to deal with each function. Corporate America, and especially the railroad industry the last 15 to 20 years, has continued to downsize, downsize, downsize to the point that there just isn't enough manpower to handle all of the workload in any of those department levels. So you cater quite a bit to internal customers the same way if you want to get anything done.

Interviewee SIX:

All of your customers are important. I couldn't survive with just one customer. I deal generally in a commodity base. Can I say that my most important customer is the distilled spirits industry?

Interviewee EIGHT:

We have a very good working relationship. We talk on a daily basis generally, and it's been a relationship that's been in place between our companies for well over twenty years.

Interviewee FIVE:

I think it generally takes a lot of involvement. You need to try to know as much about their business as possible. You need to be able to assist them in as many ways as possible. I've been to a lot of the suppliers; I've been to their plant locations. It's not necessary, but it just makes me a little more knowledgeable. They probably feel a little more comfortable because they know that I've got the knowledge. I get hit with a lot of different questions and besides just the truckload movement. Like when Beech opened up their plant there in Reynosa, they just needed information on buying equipment there, what they should do, assisting with their broker, the forwarder, and just various things.

I. THEME VIII: MANY OF THE INTERMEDIARIES ATTEMPT TO DEVELOP WORKING RELATIONSHIPS WITH THEIR COMPETITORS BUT INTENSE COMPETITION PREVENTS TRUE DIALOGUE FROM OCCURRING

All but one of the interviewees stated that they attempted to develop a working relationship with their competitors. However, all but two cited intense competition as a major obstacle to developing a long-term relationship. One of the interviewees stated that they actually depended on their competitors.

Interviewee SEVEN:

In the railroad industry we've chosen to make truck lines partners, but it's yet to be proven that you can have two competing interests at the same time also be partners. So the jury's still out on that.

Interviewee TWO:

...what has happened, there were five...producers in North America fifteen years ago. Now we are down to two, and both companies have been downsized by quote, "management buyouts" and a lot of competition occurred with people leaving one company and then going to the other company. And there's a lot of animosity between the companies now. Whereas at one time, as much as the law would permit, there was a lot of cooperation. We would actually buy product from them, ship to our customers in the area where they were located, and vice-versa. And we wouldn't even think about doing that now.

Interviewee FOUR:

...we work together to address regional needs in the area. We go to the federal government, the state government, the local city and county governments, as well as the port governmental structures to form partnerships to address those needs. And that's a big a change from the way it used to be.

Interviewee SIX:

Well, we do at this company, we really do [attempt to develop working relationships with competitors]. We have our contracts with Schneider and Hunt as well—not on the intermodal side, but on the highway side [line haul]. Cause as a third party logistics and intermodal marketing company, we are have no asset base, so we don't own any equipment. We have to depend upon the equipment owners to build and maintain their asset base.

**J. THEME IX: INDUSTRY ASSOCIATIONS ARE HAVING A LIMITED
IMPACT IN ESTABLISHING A DIALOGUE BETWEEN THE VARIOUS
INTERMEDIARIES**

All of the interviewees felt that industry associations had a limited impact in establishing a dialogue between the various intermediaries. All of them cited financial, time, and human resource constraints as the major factors influencing their degree of participation in industry associations.

Interviewee SEVEN:

It's probably about the only forum you've got these days. The problem, in getting participation to the level you need and to really see hard action come out of it, is finding time. Most of the folks are working on slim or no budget. They are worked to death already. They don't have time to get away from the telephone and job to participate in association events, where you can share and communicate and try to form some synergies between one another. The time just doesn't exist. They're constantly dealing with day in and day out volumes of freight and issues directly related to being in business. So it's hard to get the associations to function to the degree where they probably would be extremely successful. Simply from lack of time to participate.

Unfortunately, the only place where I see potential is perhaps the Internet. If an open dialog could be established, then people would feel fairly free to discuss the issues. If you could form associations around chat rooms and folks could actually go on-line while they're at their desk, still doing their job and learn and share, maybe there's a prayer that way. But physically getting people together face-to-face to do dialogue, that's still going to be a wish, a dream.

Interviewee SIX:

Yeah. You know that's a tough one because there are a lot of associations around but they're struggling. I think it was more participation in years past. We used to belong to everything. I used to belong to everything personally and the companies all did. I don't know; now the associations seem to have fewer and fewer memberships. People find it hard and companies are finding it harder and harder to allocate time, people, and funds, all three things, to go away someplace and spend three or four days in a seminar. I don't know if I hate to say it or not, but it's just kind of a dying thing from what I see. The Intermodal Expo in Atlanta is a prime example. That thing used to draw ten thousand people to the Intermodal Expo in Atlanta every year. And now they're lucky to get a couple thousand people in attendance.

Interviewee EIGHT:

I still think it's in infancy because both sides don't trust each other. There's got to more partnership and more give and take and more honesty basically to get everybody together.

**K. THEME X: DEREGULATION HAS BEEN GOOD FOR THE INDUSTRY
BUT THE LACK OF STRATEGIC PLANNING AND RESOURCES IS
PREVENTING THE INDUSTRY FROM BECOMING MORE EFFICIENT**

When asked, "What governmental policies and regulations should be enacted or repealed to improve the industry?" most of the interviewees stated that deregulation had been good for the industry but noted that the government failed to conduct strategic planning and provide much-needed resources. One interviewee felt that there should be less government involvement in the industry.

Interviewee FIVE:

I think that deregulation has been beneficial. I think it's made things more competitive. The ease of entry, I guess that probably tends to put you in the situation where you're a little more concerned about safety issues. But I think most of this is due to the federal government, they watch what's going on. I think they do a good job. I think probably there's a lot of trucks out there. Percentage-wise, the trucks are probably a lot safer than cars on the highway. I think that trucks can do a lot of damage if something goes wrong, but most of the equipment out there is in good condition and it's taken care of. Bigger companies have the resources and they have a good maintenance program. They try to stay on top of it [commercial vehicle safety issues]. I think some of the smaller companies have a hard time trying to stay on top of it [commercial vehicle safety issues] because of owner operators, driver shortages, and limited resources. I think with the current regulations out there, I don't see a big problem with it [commercial vehicle safety issues]. Maybe I'm not in a position to know everything that's happening. From what I can see, it [commercial vehicle safety issues] can't be compared to what you see on the border in Mexico. It's amazing.

Interviewee SEVEN:

Probably the number one thing we've been missing for decades is an effective long-term transportation plan. What you have is based on who's empowered at the time. You know, it's who is the president and how much are they concerned about the freight industry or commuter industry or, you know, what it takes to move goods and services and people. And

we have still have not come to grips with a national transportation policy that weighs all factors. And without that, I think we're still floundering at a local or regional level and we're certainly not taking the best of each mode, we're certainly not coordinating the modes, we're certainly not looking at what the future demands are going to be. Every city that I've lived in the last 30 years didn't seem to have any visionaries on their payroll cause they certainly didn't understand that the growth was coming in spite of anything they did. Deal with it, zone it, work with it, you know, instead of just letting the developers come in for the top dollar, get whatever they wanted, build whatever they wanted to, and cash in and leave. Whoever was the makeup of the community after that had to deal with the problems. Still seeing that everywhere we go. Small city, big city, small town, rural—they're all dealing with it to any number of different degrees. And it's all because we lack a national transportation plan and then that filters down to the state and regional levels, all the way down to the local communities lacking a plan. If anything, that's what I hope for, that in the next five or 10 years we end up with some policymakers that understand that, legislate it, and then appropriate for it.

Interviewee SIX:

Yes, I do. I was all for deregulation because, to be quite honest, we're moving freight today at less cost to the customer than we were 15 years ago. Eventually, everything that moves in this country starts with somebody buying raw materials and making a product, then add the price of getting it transported, and that is what you're going to pay for the net end-result product, whatever it is you're buying. And if things had stayed the way they had, no telling how much our consumer dollar would be buying today. I would venture to say it wouldn't be as much as we're getting now. Cause I'm moving freight today from Louisville, Kentucky, to Seattle, Washington for \$1400 a load. On a cost per mile, that's pretty cheap, that's pretty cheap [slim profit margins]. And even back in 1980, just before deregulation, we couldn't move it for that; we couldn't touch it for that.

Interviewee TWO:

Sometimes it's hard to understand what the government's intentions are. I'm sure that at some level they're meant to help. At least they're meant to help certain factions. It's a constant battle. They create more cost than necessary. The less involved the government is, the better off we are.

**L. THEME XI: THE MORE EXPERIENCE INTERMEDIARIES HAVE
WORKING WITH THE MILITARY THE BETTER THE RELATIONSHIP**

Those interviewees that had more experience working with the military stated that they enjoyed a good working relationship with the military. However, the interviewees that worked with the military only on occasion found the experience to be frustrating and costly.

Interviewee THREE:

We have a very good working relationship. We're obviously directly involved in the planning for the exercises that...just talked about. And, when as often is the case in the military, mainline railroads for that matter, you just get to working with a group of people that are really up to speed and then they're transferred somewhere else and a whole new crop comes in. They will bring the new crop of people down here and talk with us and ask a lot of the same kind of questions you're asking. You know, like how do guys accommodate these vessels and so forth. And so it's an ongoing kind of a thing, but it's working well. I mean, as one of the outposts for the military, they concentrate a lot of effort here, not only because we're close to large bases, but because of past history. We're really good at it. So, I think we have a very good relationship with the military.

Interviewee SEVEN:

As a railroader, specifically, we do a lot of training movements a couple of times a year from a couple of forts that we physically serve. We'd actually put together entire trainloads of equipment and supplies and start them out on the rail network that goes somewhere else in the countryside to do their deployments, play around for awhile, load back up and come back. So we have a fairly effective relationship with the military.

Interviewee ONE:

Let me say this, if you deal with the military, you better put the weight charge triple. Cause they keep sending you to the wrong places with the same container.

Interviewee TWO:

Yes, I have [worked with the military]. I'm currently not doing that, but yes I have and it always meant some type of stupid inspection. Anytime we sell to the government; we always automatically double the price because of the stupidity that you have to deal with. I mean, no exception, we double the price every single time.

M. COMMENTS: INTERVIEWEE COMMENTS FOR MILITARY PLANNERS

When asked, "What emerging trends in the commercial sector do you think are important to military planners?" Many of the interviewees responded that they had no comment. Thus, no central theme could be developed. However, three of the interviewees did provide the following interesting comments:

Interviewee SEVEN:

There is a blurring of the lines between commercial and military logistics needs. We're seeing a lot, use the term privatization if you want to, but the military used to have apparently proprietary carriers and that's all they did, proprietary equipment for everything, even the simple stuff. If you were moving tons of tissue paper just to support the latrines, they still went through a proprietary system and proprietary rates, proprietary billing and so forth. We're seeing that blur. We think that some of the assets that the military, whether it's property that underutilized or not utilized at all but they're going to keep it for national emergency, that holds potential for partnerships. And we're seeing some of that develop around the country where the military takes an active commercial role in working with private enterprise to develop economic development or other commercial use of military property. We're seeing transport as it directly relates to the rail industry where they might have kept boatloads of flatcars available for this military transport. They just sit around idle doing nothing and it was a huge capital expense. They're now starting to look at how to commercialize that and use that asset in the commercial world and earn some kind of return to offset the tax dollar that was spent to capital build it in the first place.

Interviewee EIGHT:

I think the military is a highly charged issue in terms of international transportation because they want that cargo to go on US-flag carriers and there really aren't any now. So I think the planners should look at what they're getting for their money and if viable, do it. But I think the bottom line is that they're going to support American flag carriers because it is military government cargo.

Interviewee FOUR:

I think that the military has some tremendous logistics programs and I may be naïve in this because I'm not in the military and haven't been since Vietnam. But the point is, maybe your question could be turned around the other way. You know, you guys have access to computers that can do things within the military and between the branches of the military. The computers exist in the commercial world, but that just ain't happening between industries. So, perhaps you guys should help the industry.

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V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY AND CONCLUSIONS

The primary research question for this thesis is: What are the key emerging trends in the commercial intermodal freight transportation industry?

The literature review (Chapter II) cited the U.S. government's Transportation Equity Act for the 21st Century (TEA-21), dramatic developments in transportation and information technology, and the increasingly complex nature of the interrelationships that exist between intermediaries in the industry as emerging trends in the intermodal freight transportation industry. The literature review was conducted to research what was being written and reported on emerging trends in the industry. However, the information obtained from the interviews is intriguing and of great interest.

The eight interviewees, composed of two women and six men, represent seven different intermediaries in the intermodal freight transportation industry. Each interviewee is employed at an operational level and, as such, is involved in the day-to-day operations of the intermediary they represent. The interviewees have a combined total of 243 years of experience in the industry. With an average of 30.4 years of experience per interviewee, which ranged from 19 to 45 years, the views of these individuals, as a group, provide an excellent representation of the industry.

Their interviews, unlike the literature review (which only cited what was being written and reported), reveal the extent to which identified emerging trends are

penetrating the industry; and what effect, if any, these trends are having on the day-to-day operations of the various intermediaries.

The researcher conducted a content analysis of the interviews and from that process derived eleven major themes. The themes are used to answer the following secondary research questions:

First, which technological developments are having the greatest impact on the commercial intermodal freight transportation industry?

- THEME I: The fax machine is one of the technological developments that has had a great impact on the intermodal transportation industry.
- THEME II: Total asset visibility (TAV) through web-based solutions is having a great impact on the intermodal transportation industry.
- THEME III: Technological developments have improved the ability of the intermediaries to provide better service to their customers.

The data seem to indicate that many emerging technological developments in the intermodal transportation industry have not penetrated to the operational level, especially in companies with small to medium capitalization. The technologies that *have* penetrated are lower in cost and immediately effective in providing better service to customers.

Second, which business “best practices” are having the greatest impact on the commercial intermodal freight transportation industry?

- THEME IV: The intermodal transportation industry is able to attract and retain dedicated employees.
- THEME V: The intermediaries are not providing professional or new technology training to their employees.

- THEME VI: The most common business “best practice” is a common sense approach to daily operations that involves knowing your cost, your customer, and communicating.
- THEME VII: Good customer relationships are viewed as being extremely important.

In conclusion, probably the most striking information to come out of this research is that people employed in the intermodal freight transportation industry are provided only limited professional or new technology training.

The interviewees with a combined total of 243 years of experience in the transportation industry, responded that the vast majority, if not all, their training was from on-the-job training (OJT). Despite a lack of professional or new technological training, these interviewees and the thousands like them employed in the industry, have made possible the most impressive productivity gains in logistics that the nation has ever experienced.

A report issued by the U.S. Department of Commerce’s Bureau of Economic Analysis (BEA) shows that transportation services contributed \$378 billion to the national economy in 1996, the latest year for which figures are available. Furthermore, productivity gains in business logistics reduced costs by \$23 billion in 1995, as compared to 1994. Savings in 1995 compared with 1989 productivity levels are estimated at \$150 billion. (BEA, 2000)

One is left to imagine what could be accomplished, and the resulting impact on the nation, if these individuals had access to newly emerging technologies and the professional and technological training to optimize their capabilities.

Third, what are the major interrelationship dynamics in the industry?

- THEME VIII: Many of the intermediaries attempt to develop working relationships with their competitors but intense competition prevents true dialogue from occurring.
- THEME IX: Industry associations are having a limited impact in establishing a dialogue between the various intermediaries.

Interviewees stated that they are operating on very thin profit margins, due primarily to intense competition and the power of certain shipper associations (e.g., the National Industrial Transportation League (NITL)) to lobby and negotiate rates charged for the transportation of goods. The intermediaries have very limited financial, time, and human resources to dedicate to industry associations. As a result, industry associations are having a limited impact on improving dialogue.

Fourth, what governmental policies and regulations should be enacted or repealed to improve the industry?

- THEME X: Deregulation has been good for the industry but the lack of strategic planning and resources is preventing the industry from becoming more efficient.

Deregulation has certainly made the industry more competitive, but at what price?

If the trend towards diminishing profit margins continues, many of the small-to-medium capitalized companies will be forced from the intermodal freight transportation industry.

Efficiencies in total supply chain management cannot be gained by reducing the cost of transporting goods, alone. To optimize efficiency throughout the intermodal freight transportation industry will require the concerted efforts of the government, industry, and academia.

In addition, a single theme was derived from the interviewees' responses to the following question concerning the military:

Fifth, have you ever done business with the military? If so, what kind of working relationship do you have with the military?

- **THEME XI:** The more experience intermediaries have working with the military the better the relationship.

The complex interrelationships between DoD, the U.S. Department of Transportation (DOT), and the commercial industry play a critical role in the movement of military personnel, equipment, and cargo in times of peace and war.

Therefore, it is a conclusion of this thesis that DoD's reliance on the commercial transportation industry requires the DoD to be proactive in ensuring that all the intermediaries, even those with little to no experience in working with the military, have access to the necessary information required to work efficiently and effectively with the military.

B. RECOMMENDATIONS

1. Develop a Collaborative Strategic Transportation Plan, Implement the Necessary Regulations, and Allocate the Required Resources

The U.S. Department of Transportation's current Strategic Plan provides a comprehensive vision for advancing the nation's transportation system. A collaborative plan will require the concerted efforts of the U.S. government, industry, and academia.

Major transportation policy directives are legislated by Congress. In the past, direction was often fragmented due to the interests of the many committees that had oversight of the various modes of transportation. Today, major policies and regulations are being refocused to provide for more modal coordination and overall efficiency, but much remains to be done, especially in regards to providing incentives for increased coordination between the various modes.

Financial resources are provided by the Transportation Equity Act for the 21st Century (TEA-21), which guarantees funding for transportation infrastructure and safety. Although TEA-21 provides more funding than its predecessor the Intermodal Surface Transportation Efficiency Act of 1991, additional funding is required.

2. The Department of Defense (DoD) Should Work in Partnership with the Small and Medium Capitalized Companies in the Industry

The United States Transportation Command (USTRANSCOM) is responsible for the Defense Transportation System (DTS), the worldwide transportation infrastructure that supports the DoD in peace and war. USTRANSCOM's Business Center currently manages the industry visitation program and monitors changes within the transportation business environment that could impact the DTS. However, as the data from the interviews imply, it appears that existing programs are not reaching many of the small and medium sized companies in the industry.

The Military Traffic Management Command (MTMC), a component command of USTRANSCOM, is responsible for coordinating most of DoD's freight movements by

commercial railroads, trucking firms, barge companies, and ocean liner operations.

MTMC must forge a closer, more cooperative relationship with the commercial intermodal freight transportation industry, and is currently taking major steps to do so (e.g., through MTMC's Small and Disadvantaged Business Utilization Office (SADBU)).

3. Develop and Maintain Educational Programs for the Intermodal Freight Transportation Industry's Future Managers and Technicians.

The U.S. government, industry, and academia must work in a collaborative effort to develop and maintain educational and internship programs to prepare present and future transportation managers and technicians to become the industry's leaders.

Although dramatic developments in advanced technologies have been the single greatest factor influencing changes in transportation during the past 25 years, it is people who manufacture goods, provide transportation services, and ultimately consume the goods produced. Therefore, it is the "human-in-the-loop" who when properly equipped, trained, and experienced will truly revolutionize the commercial intermodal freight transportation industry.

C. POTENTIAL AREAS FOR FURTHER RESEARCH

The following topics are suggested:

- Conduct a cost/benefit analysis of providing and maintaining educational programs for the intermodal freight transportation industry's future managers and technicians.
- Conduct an analysis of current DoD training and incentives for its intermodal transportation logistics managers and technicians.

- Review potential methods for DoD to improve working relationships with small-to-medium capitalized intermodal freight transportation companies.
- Conduct an analysis of the ability of certain shipper associations (e.g., the National Industrial Transportation League (NITL)) to lobby and negotiate rates charged for the transportation of goods and the resulting effect on the adequacy of profit margins in the industry.

APPENDIX A. INTERVIEW GUIDE

Respondent #:

Intermediary Type:

Title/Job Description:

A. INTERRELATIONSHIPS:

1. How long have you been in the industry?
2. Who is your most important customer?
3. What kind of working relationship do you have with them?
4. Who is your strongest competitor?
5. What kind of working relationship do you have with them?
6. To what extent are industry associations helping to establish a dialogue between all the various intermediaries?

B. TECHNOLOGY

1. Which technological developments are having the greatest impact on the industry and the way that you do business?

Probe: Are the new technologies (EDI, TAV, RF, MODEL/SIM, NET) really changing the way you do business? If so, how?

Probe: How much time and money does your company expend on new technologies and training people to use them?

Probe: To what extent is information technology influencing industry participants to work together?

Probe: Who controls most of the information in the industry?

2. To what extent have these technologies improved your relationship with your customers?

C. BUSINESS “BEST PRACTICES”

1. Which business “best practices” are having the greatest impact on the industry and the way that you do business?

Probe: ABC or Profit Optimization, Benchmarking, JIT/Inventory Optimization/In-Transit Inventory, Empowerment, and Dialogue to name a few.

2. How much training did you receive before taking your current position? Do you think it was enough?
3. Are you rewarded for making the process more efficient or effective for your customers?

Probe: Do you think it’s enough for what you do?

Probe: To what extent does your pay/rewards/bonuses influence your actions?

D. POLICY AND REGULATIONS

1. What governmental policies and regulations should be enacted or repealed to improve the industry?

Probe: What has been the effect of deregulation on the industry?

Probe: What are your views on safety issue?

Probe: As a taxpayer, how much do you think the government should spend to maintain or improve the nation’s transportation infrastructure?

E. MILITARY

1. What emerging trends in the commercial sector do you think are important to military planners?
2. Have you ever done business with the military? If so, what kind of working relationship do you have with the military?

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APPENDIX B. THEMES DEVELOPED FROM INTERVIEWS

THEME I: The fax machine is one of the technological developments that have has a great impact on the intermodal transportation industry.

THEME II: Total asset visibility (TAV) through web-based solutions is having a great impact on the intermodal transportation industry.

THEME III: Technological developments have improved the ability of the intermediaries to provide better service to their customers.

THEME IV: The intermodal transportation industry is able to attract and retain dedicated employees.

THEME V: The intermediaries are not providing professional or new technology training to their employees.

THEME VI: The most common business "best practice" is a common sense approach to daily operations that involves knowing your cost, your customer, and communicating.

THEME VII: Good customer relationships are viewed as being extremely important.

THEME VIII: Many of the intermediaries attempt to develop working relationships with their competitors but intense competition prevents true dialogue from occurring.

THEME IX: Industry associations are having a limited impact in establishing a dialogue between the various intermediaries.

THEME X: Deregulation has been good for the industry but the lack of strategic planning and resources is preventing the industry from becoming more efficient.

THEME XI: The more experience intermediaries have working with the military the better the relationship.

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